a trade with another party, and then later resume negotiations with the initial party. Each buyer (seller) could trade with each seller (buyer) at most one time in a trading period. Figure 1 depicts the software interface **sellers** used to negotiate with buyers.

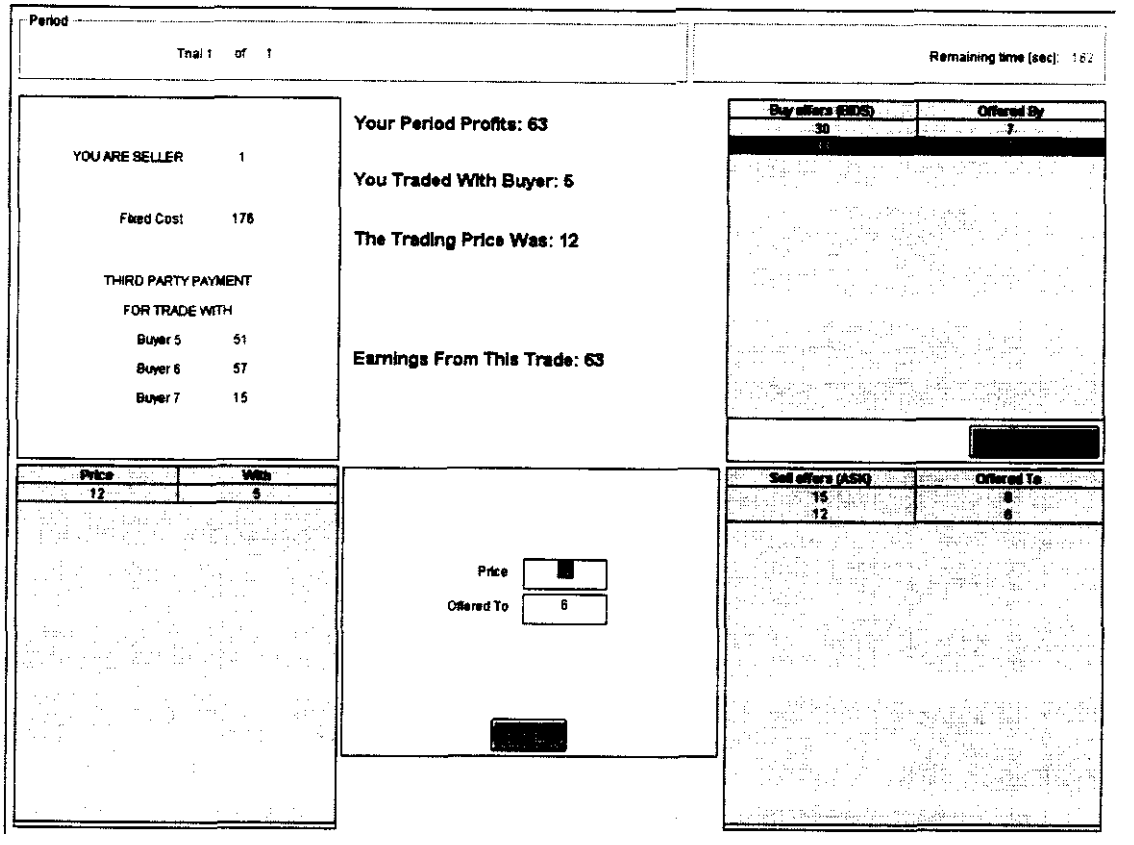

Figure 1: A Typical Seller Screen

The **seller's** screen is comprised of six areas. The upper left area shows the seller's assigned level of unavoidable costs as well as the level of the thud party payments the **seller** would receive from conducting a trade with any particular buyer. The lower left corner shows the set of trades the seller has already conducted **in** the trading period. For example, the **seller** has already traded with Buyer ***5*** at a price of 12 in the current trading period. The upper center area shows the **seller's** most recent trade, its

obtained additional price information when sellers conducted trades with non-MFN-endowed buyers that triggered the MFN provision.

earnings from that trade, and total profit in the period.[42] The lower center area is where the seller creates an "ask" (an offer to sell) and where the seller can identify to whom the ask should be electronically submitted. The PLACE **ASK** button executes the entry. At that time, a variety of checks are run to make sure the ask is valid.[43] In this instance. the seller has placed an ask of 12 to Buyer ***6***. The upper right area shows the bids (offers to buy) that have been offered by various buyers to this seller. The left column indicates the amount of the bid and the right column is the identity of the bidder. **As** shown, Buyer 7 has recently raised its bid from 30 to 33. **A** seller can complete a trade with a buyer by accepting the buyer's bid.[44] **A** seller accepts a buyer's bid by moving a cursor in a manner that highlights the bid he wishes to accept. The sell button executes the trade.[45] The lower right area shows all asks this seller has offered during the trading period. The left column indicates the amount of the ask and the right column indicates the identity of the bidder to whom the ask was offered. **As** shown. the seller has recently lowered its ask that it submitted to Buyer ***6*** from **15** to **12.**

Figure **2** depicts a screenshot of the software interface used by the buyer. It is similar to the seller's screen except that the lower center portion of the screen is where the buyer creates a "bid to buy and where the buyer can identify to whom the bid should be electronically submitted. The upper right area lists all bids the buyer has placed in the trading period. **As** shown. the buyer has placed a bid of 100 to Seller **2** and a bid of ***55*** to Seller 3. The lower right area shows all the asks that have been sent to the buyer. **A** buyer can complete a trade with a seller by accepting the seller's ask.[46] **A** buyer accepts a seller's ask by moving a cursor in a manner that highlights the ask he wishes to accept. In this case, the buyer has yet to receive an ask from a seller. The buy button executes the trade.

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[42] Depending on the experimental session. the "Your Period Profits" calculation was either net of the seller's costs or only reported the sum of earnings from all trades. In either case, the panicipants were informed of the substance of the calculation and were advised to also complete similar calculations by hand.

[43] The checks determine whether a trade satisfies the set of constraints that exist in the market. For example, a check is completed to determine if the seller has already traded with the buyer. **A** check is also completed to determine whether the submitted bid/ask satisfies the bid/ask improvement rule.

[44] **A** seller can also complete a aade with a buyer when the latter accepts the seller's submitted ask.

[45] The execution function lowers the likelihood that the subject completes a trade in error.

[46] **A** buyer can also complete a trade with a seller when the latter accepts the buyer's submitted bid.

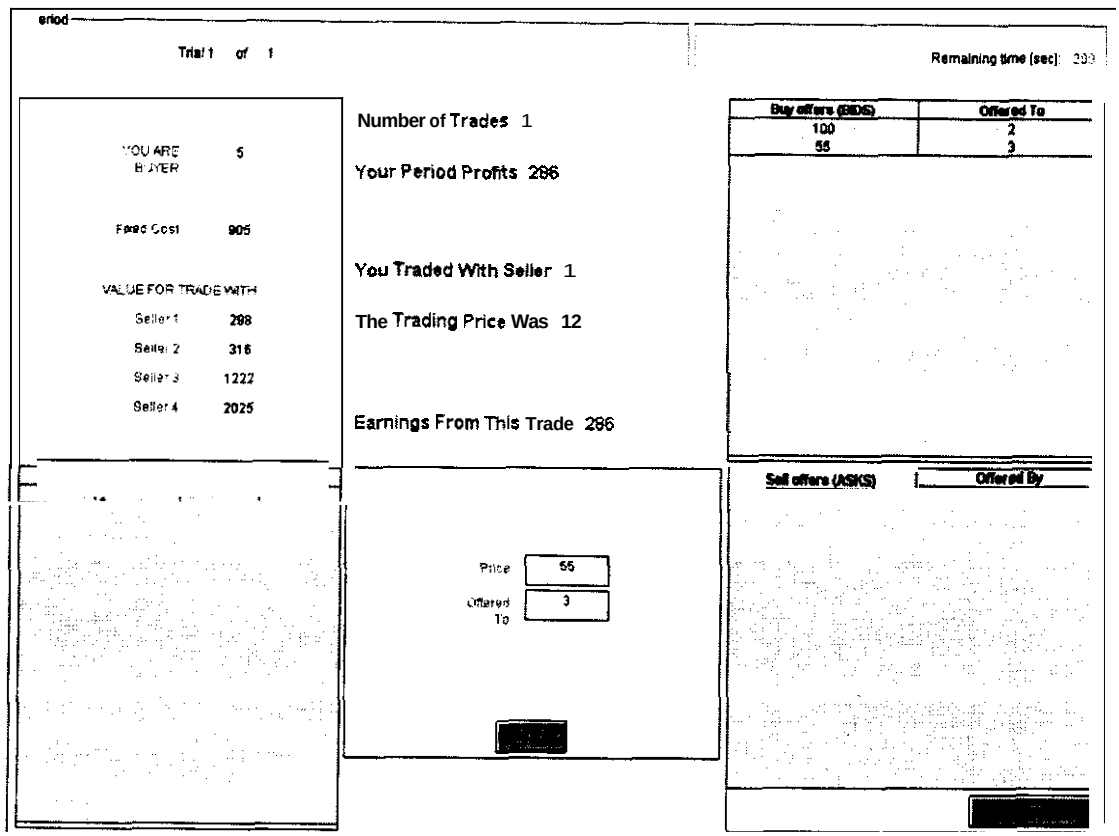

Figure 2: A Typical Buyer Screen

At the end of a trading period, participants were given time to calculate and record their profits. When they were ready to continue, participants would press a CONTINUE button at the bottom of the screen. The next trading period would begin once all subjects were ready. **At** the end of the eighth trading period, subjects were asked to calculate their total profits – the sum oftheir profits from the eight trading periods plus their working capital – and to multiply that amount by the conversion rate of .002.[47] Subjects were then paid their total earnings in private and in cash. They were then free to go.

[47] **A** conversion rate of **,002** indicates that participants were paid $.002 for every experimental dollar they earned in the experiment. Some early sessions used a conversion rate **of** .003.

3.3 Performance Measures

This section discusses and formally defines several methods of evaluating market performance. Let $i=1,2,...,n$ be the set of buyers and $j=1,2,...,m$ be the set ofsellers. Let TPP_j^i be the thud party payment sellerjreceives from trading with buyer i. Let WTP_i^j be the willingness to pay for buyer i for a trade with seller j. Let P_{ij} be the price (assumed positive) that buyer i pays **seller** j. Let $x_{ij}=1$ if buyer i trades with seller j and 0 otherwise. Finally, let C_i and C_j represent the unavoidable costs of a buyer i and a sellerj respectively.

> *Economic Efficiency:* Economic efficiency measures the extent to which society makes the best **use** of its scarce resources. In the current context, society obtains the largest benefit when buyers and sellers conduct a set of trades that maximize the sum ofthe gains from trade enjoyed by buyers and **sellers.** Efficiency is measured as the ratio of the sum of the gains enjoyed by trading participants divided by the maximum possible gains from trade.

The set of economic efficient allocations (under the **CAP** treatment) can be determined by solving the following maximization problem:

$$\max \sum_{i=1}^{n}\sum_{j=1}^{m} x_{ij}\left(WTP_i^j + TPP_i^j\right)$$

$$s.t. \qquad (5.1)$$

$$\sum_{j=1}^{m} x_{ij} \le 3$$

$$x_{ij} \in \{0,1\}$$

Let S^* be the total profits under an efficient allocation. That is, S^* represents the value of the objective function **(5.1)** at the maximum minus the sum of unavoidable costs. Note that due to the capacity constraints. this value can vary from treatment to

treatment. **Also,** more than one allocation can be economically efficient." The efficient allocation under the UNCAP treatment is simply program (5.1) without the capacity constraint. It follows that $x_{ij}=1$ for all i and j. Table 6 lists the efficient surplus in the treatments examined.[49] Under the *CAP* treatments, the efficient allocation always requires that each buyer trades with **Sellers 3** and 4 and either Seller 1 or **2.**

Environments	Unlimited Capacity	Limited Capacity	
		No MFN	MFN
LOW Concentration/High Numbers	82 17	8650	8650
High Concentration/High Numbers	6464	8644	8644
High Concentration/Low Numbers	*	8649	8649

Table *6:* Efficient Total Surplus *(S')*

Under an efficient allocation, society is obtaining the most benefit from its scarce resources. In the presence of a capacity constraint, an efficient allocation means that trades have occurred between the set of buyers and sellers whose participation in a trade creates the greatest economic surplus. In the absence of a capacity constraint, an efficient allocation means that all feasible trades have occurred. In the presence or absence of a capacity constraint, an inefficient allocation means that society has left "money on the table." In most settings, a profit maximizing buyer (or seller) with market power will lead to an inefficient allocation. For example, a monopolist restricts output below the

[48] Under the parameters used here, the efficient allocation is unique for all treatments except the Low/High **CAP** treatment **where** Buyer 1 **is** indifferent between **buying** from **Seller** 1 or **2.**

[49] The efficient surplus **in** the **UNCAP** treatments **is lower** due to small, inconsequential variations in the parameters used and the lack of a DBS buyer in the High/High *UNCAP* treatment. In addition, the first two of the Limited Capacity-No MFN experiments had slightly different parameter values than the remaining **12** experiments.

competitive level in order to maximize profits. Likewise, the Cournot equilibrium (see Appendix A) predicts some efficiency losses for any number of firms. Therefore. if one observes efficiency declines in treatments with higher concentration (or other features), then one could argue that the treatment is contributing to an overall loss in economic surplus. In order to construct a measure that is comparable across treatments. we compare the surplus of the observed allocation with S^* from above. Let x' be the binary variable reflecting observed trades in a particular trading period, and let S represent the total profits (i.e., gross surplus minus costs) resulting from these trades.

$$S = \sum_{i=1}^{n}\sum_{j=1}^{m} x_{ij}^{\cdot}\left(WTP_i^j + TPP_i^j\right) - \sum_{j=1}^{m} C_j - \sum_{i=1}^{n} C_i \qquad (5.2)$$

Our efficiency measure is then simply $E = S/S^*$.

Bargaining ***Power:*** In the current context, a buyer's bargaining power measures the percentage of the total surplus available from a given trade that accrues to a buyer. One objective of the experiments is to determine if larger buyers possess greater bargaining power than smaller buyers. More generally, **we** wish to determine whether the collective bargaining power of buyers is greater in more highly concentrated markets than in **less** highly concentrated markets. The study employs the following measure of Buyer Bargaining Power ("BBP") for each completed trade.

$$BBP_i^j = \frac{WTP_i^j - P_{ij}}{WTP_i^j + TPP_j^i} \qquad (5.3)$$

This measure normalizes the surplus enjoyed by the buyer by the total surplus available from the trade. A buyer may conduct several trades in a given trading period. Under this condition. the buyer's bargaining power over all trades made in a given irading period is defined by:

$$BBP_i = \frac{\sum_j \left(WTP_i^j - P_{ij}\right)}{\sum_j \left(WTP_i^j + TPP_i^j\right)} \qquad (5.4)$$

where each summation is taken over all sellers j which a given buyer trades with in a given trading period.[50]

BBP does not. by itself, provide a complete picture of the price setting capabilities of buyers. For example, BBP does not take into account the number or "quality" of trades conducted by a buyer.[51] For example, a buyer whose BBP value is .70 and who trades with only a single small **seller** should be differentiated from a buyer whose BBP value is also.70 but who trades with two large sellers. The following measure takes into account both the number and the quality of trades conducted by the buyer.

Buyer Surplus: Defined as the amount of surplus earned by a buyer i divided by the maximum gross surplus, GS_i^* that buyer i could obtain under an efficient set of trades.

$$BS_i = \frac{\sum_{j=1}^{m} x_{ij}^* \left(WTP_i^j - P_{ij}\right)}{GS_i^*} \qquad (5.5)$$

Similarly, the ***Buyers' Surplus*** for all buyers in a given trading period can be defined as:

$$BS = \frac{\sum_{i=1}^{n}\sum_{j=1}^{m} x_{ij}^* \left(WTP_i^j - P_{ij}\right)}{GS^*} \qquad (5.6)$$

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[50] Simple algebra shows that this measure can also be expressed as **a** weighted average of terms BBP_i^j with weights given by the total **surplus** possible in a given trade divided by the total surplus over all trades in the period.

[51] The word "quality" refers to the size of the economic **surplus** generated from a trade. The surplus generated from a trade involving a given cable operator and a popular programming network is greater than the **surplus** generated from a trade involving the same cable operator and a **less** popular programming network.

where $GS' = S' + \sum_{j=1}^{m} C_j$. A simple algebraic argument shows that *BS* can be expressed as a weighted sum of individual buyer's surpluses, as $BS = \sum_{i=1}^{n} \frac{S_i'}{S'} BS_i$

Calculating equation *(5.5)* for each buyer and then taking the average across all buyers provides a measure of the average buyer's surplus in a given treatment.

***Seller** Profits/Losses*: Sellers have been assigned non-avoidable costs that must be recovered in order for them to **earn** a profit in any trading period. The assignment of costs introduces the possibility that sellers may incur losses during the experiments. The study measures both the profits and losses earned/incurred by all sellers. Because seller profit/losses are sensitive to the parameter values employed in the experiments, particular attention is given to changes in these values across treatments.[52]

4.0 Experiment Results

The results of the economic experiments for each of the different treatments (e.g., Low Concentration/High Number: CAP No MFN) are organized according to the selected performance metrics (i.e., economic efficiency, buyer bargaining power, **seller** profits/losses). In the limited capacity, No MFN environment a non-parametric test was used to examine whether observed differences in treatment outcomes were non-random. This same procedure was not performed in the limited capacity, MFN environment because of the absence of a sufficient number of observations (i.e., sessions). The study employed regression analysis to the data generated in the limited capacity, MFN environment. In this case, an individual trade between a buyer and a **seller** is the unit of observation.[53] Finally. because participants may require **a** few trading periods to become fully accustomed to the experimental environment, it is customary to ignore several

[52] The **study** uses the term "net surplus" to describe the financial position of a participant following the completion of a trading period. **A** participant earns a profit when its net surplus is positive and incurs a loss when its net surplus is negative.

initial trading periods when conducting statistical tests on experimental data. All statistical tests conducted in this section are based upon data for trading periods 5 – 8.

4.1 Economic Efficiency

Table 7 reports the average efficiency levels for all treatments, where the average is calculated across trading periods 5 – 8 and all experimental sessions.

Environments	Unlimited Capacity	Limited Capacity	
		No MFN	MFN
Low Concentration/High Numbers	94.9%	93.0%	76.2%
High Concentration/High Numbers	80.5%	83.6%	*76.0%*
High Concentration/Low Numbers		89.0%	86.9%

Table 7: Average Economic Efficiency
(Trading Periods 5 - 8)

Result 1: For the CAP **No** MFN treatment, average economic efficiency is lowest under the High/High treatment. The difference between the efficiency value observed in the High/High and Low/High treatments is statistically significant at standard levels of acceptance. The difference in efficiency levels observed in the Highnow and Low/High treatments is not statistically significant at standard levels ***of*** acceptance. Under the channel capacity constraint ***(CAP)*** and No MFN treatment, a Wilcoxon-Mann-Whitney test finds that there is a statistically significant difference in the efficiency levels observed in the High/High treatments compared with the Low/High

[53] As discussed in Section 4.5, some of the regression models displayed a property that weakens the reliability of the statistical tests.

treatments (p-value = ,0952). This result suggests that, under the examined treatments. an increase in concentration led to a reduction in economic efficiency. However. a Wilcoxon-Mann-Whitney test finds that there is no statistically significant difference in the efficiency levels observed in the Low/High and High/Low treatments ($p = 0.2103$), nor is there a statistically significant difference in the efficiency levels observed in the High/High and Highnow treatments ($p = 0.1429$).

Result 2: A more efficient allocation is likely to occur in the UNCAP sessions. The average efficiencies under the UNCAP treatments are somewhat higher than those obtained in the *CAP* treatments. This effect can be observed by comparing the number of times the UNCAP and the Cap No **MFN** treatments generated an efficient allocation (100%). Under the UNCAP treatment, 12 out of 32 **(38%)** trading period results are economically efficient. The number of trading periods that generated an efficient allocation under the CAP No MFN treatments is **15** out of 112 (13%), while there were no instances of an efficient outcome in any of the 48 trading periods conducted under the *CAP* MFN treatments.

Result 3: The MFN sessions generate uniformly lower efficiency levels than the No MFN sessions. The absence of sufficient data made it impossible to perform the standard statistical test to determine if the observed difference was statistically significant.

4.2 Buyer's Bargaining Power

An important policy issue is whether a buyer's bargaining power increases with an increase in the buyer's size, where size is measured by the share of the MWD market served. **A** trade between a cable operator and a cable network creates an economic surplus. This surplus is composed of the amount of money the cable operator is willing to pay to carry the cable network and the amount of money the cable network earns from selling national advertising time. The affiliate fee agreed to by the two parties determines the share of the economic surplus that is assigned to each party. An affiliate fee that is equal to the cable operator's willingness to pay effectively assigns the entire economic

surplus to the seller. An affiliate fee in which the cable network pays the cable operator an amount that is equal to the cable network's national advertising revenue effectively assigns all of the economic surplus to the cable operator. For a given trade. the buyer's bargaining power is defined as the share of the economic surplus **assigned** to the buyer. Buyers will conduct multiple trades. A buyer's average bargaining power over the conducted trades is equal to the arithmetic average of the buyer's bargaining power over those trades. The experimental sessions typically had different subjects playing the role of a given buyer. The average buyer bargaining power is simply the average of these "averages." Figures 3 - 5 show the average buyer's bargaining power for the last four trading periods for each concentration treatment.

Figure 3: Average Buyer Bargaining Power (Periods 5-8)
Low/High Concentration Treatment

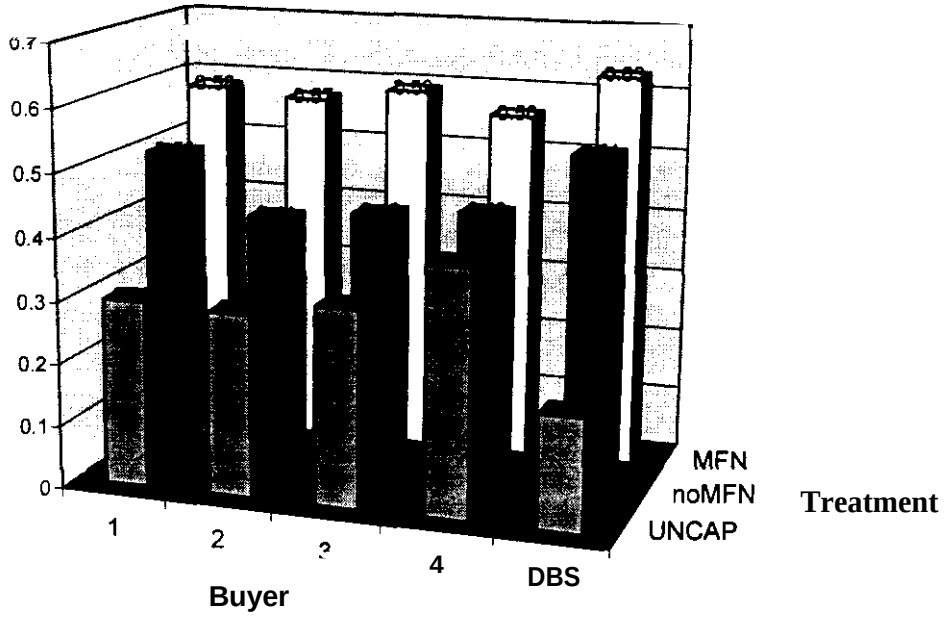


Figure 4: Average Buyer Bargaining Power (Periods 5-8)
High/High Concentration Treatment

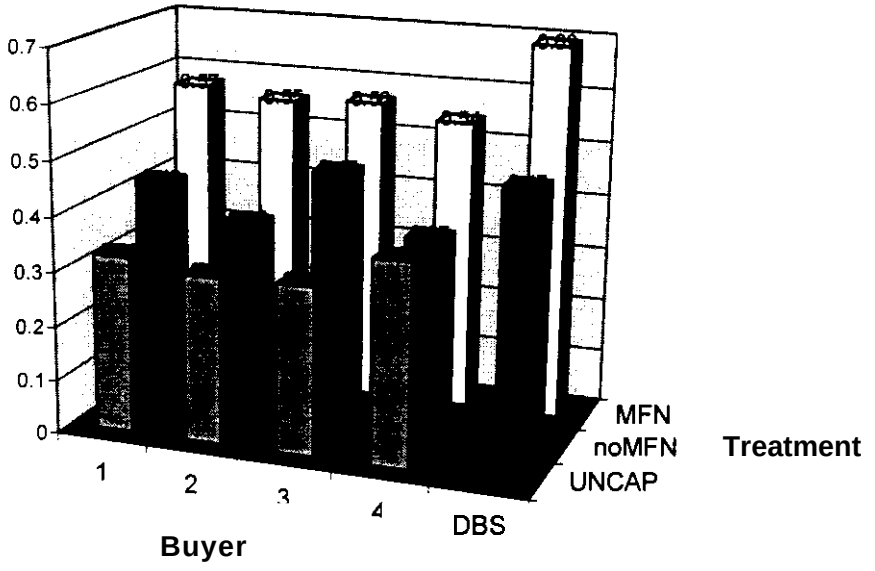
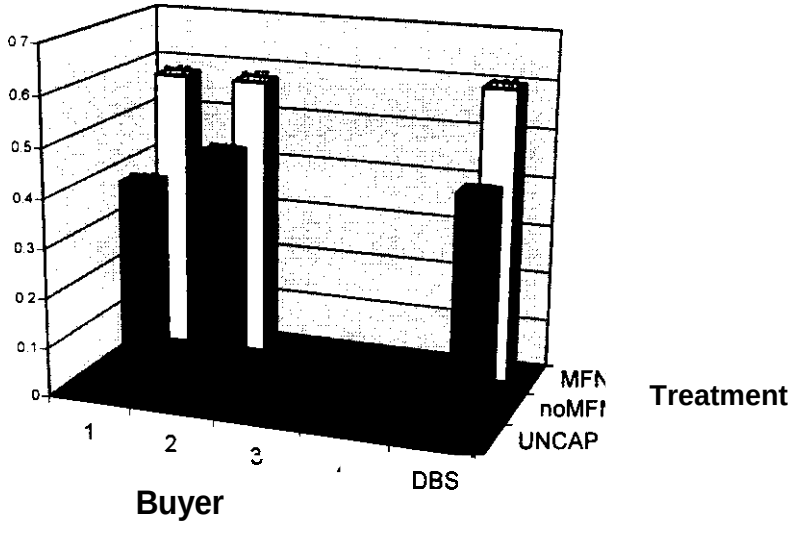


Figure 5: Average Buyer Bargaining Power (Periods 5-8)
High/Low Concentration Treatment



Result 4: The average buyer's bargaining power is substantially higher in the CAP No MFN treatment than in the UNCAP No-MFN treatment. With only one

exception, the average buyer's bargaining power was greater in the *CAP* No MFN treatment than in the UNCAP No MFN treatment.[54] This result indicates that the cable operator's bargaining power and. thus. its ability to negotiate favorable affiliate fees with cable networks, is substantially enhanced when the number of cable networks is greater than the cable operator's channel capacity.[55]

Result 5: The average buyer's bargaining power is the highest in the CAP MFN treatment. In all cases, the average buyer's bargaining power is greatest under the *CAP* MFN treatment. The relative bargaining power of the negotiating parties determines the level of the affiliate fee. An MFN clearly alters the relative bargaining power of the two parties. There is no obvious explanation why the inclusion of an MFN augmented the average buyer's bargaining power. Most striking is the fact that the MFN not only augmented the bargaining power of the MFN endowed buyer, but it also augmented the bargaining power of non-MFN endowed buyers.

Table 8 lists the average buyer's bargaining power aggregated across different buyers for the final four trading periods (i.e., Periods *5-8)* for each concentration level in the CAP No MFN treatment."

[54] That one instance occurred with Buyer #4 in the High/High concentration treatment. In this case, there was no difference in Buyer #4's bargaining power.
[55] See "Who is Watching This Stuff," Wall Street Journal, Section B, April **24,** 2002 for a brief discussion of the effect of channel rationing *on* the business models of cable networks.
[56] Table 12 contains a single value for each concentration treatment. This was accomplished by performing an additional average calculation involving the different buyers in each concentration treatment.

Environments	Unlimited Capacity	Limited Capacity	
		NoMFN	MFN
Low Concentratiod High Numbers	29.6 %	46.0 %	58.6 %
High Concentration/High Numbers	29.1 %	41.9 %	58.4 %
High Concentration/Low Numbers	*	42.6 %	58.3 %

Table 8: Average Buyer's Bargaining Power (Trading Periods 5 - 8)

Result 6: The average buyer's bargaining power (CAP No MFN treatments) is not related to the level of horizontal concentration. In the experimental sessions performed under the **CAP** No MFN treatment, there is no significant difference in the average buyer's bargaining power across concentration treatments. **A** Wilcoxon-Mann-Whitney test finds that there is no statistically significant difference in the average buyer's bargaining power in the Low/High versus High/High treatments (p-value = 0.3651), nor is there a statistically significant difference in the average buyer's bargaining power in the High/High and HighiLow treatments (p-value =.5476). Finally, the same test finds that there is no statistically significant difference in the average buyer's bargaining power in the High/Low and Low/High treatments (p-value = 0.3452).

The process of averaging bargaining power across buyers may hide effects that can only be observed with less aggregated data. Thus, we examined **some** possible relationships employing less aggregated data. Table 9 lists, for the *CAP* No MFN treatment, the share of the MVPD market served by the largest cable operator in the

different concentration treatments and the bargaining power displayed by that cable operator."

Treatment	Largest Buyer MVPD Market Share	Bargaining Power
Low Concentration/High Numbers	26.8 %	43.4 %
High Concentration/High Numbers	51.0 %	41 0 %
High Concentration/Low Numbers	43 9 %	46.3 %

Table 9: Largest Buyer Market Share and Bargaining Power *CAP* No-MFN Treatment (Periods 5 -8)

Result 7: There is no statistically significant difference in the bargaining power of the biggest buyer in each of the three concentration treatments. **A** Wilcoxon-Mann-Whitney test found no statistically significant difference in the bargaining power possessed by a cable operator that controls 51% of the MVPD market and a cable operator that controls 26.8% of the MVPD market (p-value = .4524).

Table 10 reports the average bargaining power (Periods 5 – 8) for the **DBS** buyer in the **CAP** No MFN treatment.

[57] Because buyer bargaining power measure is normalized by the size of the trade, it is possible to compare average bargaining power across buyers in different treatments with different levels of concentration.

Environments	Unlimited Capacity	Limited Capacity	
		NoMFN	MFN
LOW Concentration/High Numbers	18.0%	53.6%	63.0%
High Concentratiofligh Numbers	*	41.4%	69.3%
High Concentration/Low Numbers	*	42.9%	59.8%

Table 10: DBS Operator's (Buyer 5) Bargaining Power (Trading Periods 5 - 8)

Result 8: The DBS operator's bargaining power declines between the Low/High concentration treatments to the High/Low concentration treatments. This difference in **DBS bargaining power is statistically significant. As** shown in Table 10, the DBS operators' bargaining power is highest under the Low/High concentration treatment. **A** Wilcoxon-Mann-Whitney test shows that the DBS operator's bargaining power in the Low/High concentration treatments is higher, in a statistically significant manner, than in the High/Low concentration treatments (p-value = .0754). This result suggests that higher concentration levels would negatively impact the DBS operator's bargaining position. The reduction in bargaining power would cause the DBS operator to pay higher affiliate fees to cable networks. Insufficient data prevents an assessment about whether this effect holds under the CAP MFN treatment.

4.3 Buyer Surplus

Table 11 reports the average buyer's surplus as a percentage of the maximum possible surplus under the economically efficient allocation. The averages were calculated using data from trading periods **5 – 8.**

Environments	Unlimited Capacity	Limited Capacity	
		NoMFN	MFN
Low Concentration/High Numbers	**30.3%**	44.0%	**49.7%**
High Concentration/High Numbers	**28.6%**	**40.2%**	**49.2%**
High Concentration/Low Numbers	*	40.0%	**53.4%**

Table 11: Average Buyer's Surplus
(Percentage of Maximum Possible Surplus)
(Trading Periods 5 - 8)

Result 9: There is no statistically significant difference in the average buyer's surplus across concentration levels in **the Cap No MFN treatments.** According to a Wilcoxon-Mann Whitney test, there is no statistically significant difference in buyer surplus across concentration treatments in the Cap No MFN treatment. The calculated p values for the pair-wise comparisons are .3452 (Low/High v. High/Low), **,3651** (Low/High v. High/High), and **,5476** (High/High **v.** High/Low).

Result 10: Average Buyer surplus is highest under the CAP MFN treatment and lowest under the UNCAP treatment. A large cable operator's ability to impose an **MFN** provision on sellers and the presence of a capacity constraint substantially enhances average buyer surplus. **A** statistical test designed to examine the statistical significance of the observed difference was not performed because of the limited number of observations. The effect of limited channel capacity and an MFN also appears when considering the average buyer's bargaining power.

The share of the MVPD market served by the DBS operator (i.e., Buyer *5)* remained constant across all treatments. This consistency permits an examination of whether the DBS operator is negatively affected by changes in horizontal concentration

among cable operators. Table 12 reports the surplus earned by the DBS operator as a percentage of maximum surplus under the economically efficient allocation.

Environments	Unlimited Capacity	Limited Capacity	
		No MFN	MFN
LOW Concentration/High Numbers	17.5%	50.6%	47.8%
High Concentration/High Numbers	*	46.5%	37.3%
High Concentration/Low Numbers	*	40.5%	57.0%

Table 12: DBS Operator's Surplus (Percentage of Maximum Possible Surplus) (Trading Periods 5 - 8)

Result 11: The DBS operator's buyer surplus is highest in the Low/High concentration treatments. The difference in DBS operator's buyer surplus between the Low/High and High/Low concentration treatments is statistically significant. A Wilcoxon-Mann Whitney test reveals a statistically significant difference in **DBS** operator buyer surplus between the Low/High and High/Low concentration treatments (p-value = ,0952). This result in consistent with Result **8** that showed a reduction in **the** DBS operator's bargaining power from a movement from a Low/High to a High/Low concentration environment.

4.4 Seller Profits and Losses

Table **13** reports the percentage of sellers that incurred a loss in a given traded period pooled across trading periods 5 – **8.** Table 13 also shows the size of the average **loss.** expressed in experimental dollars.

Environments	Unlimited Capacity	Limited Capacity	
		NoMFN	MFN
LOW Concentration/High Numbers	3.1%	38.8%	53.1%
	-425	-88 5	-240.8
High Concentration/High Numbers	0.00%	35.9%	62.5%
		-127.6	-159.4
High Concentration/Low Numbers	*	32.5%	62.5%
		-121.2	-154.3

Table 13: Percentage of Sellers with Trading Period Losses and Average Loss (Trading Periods **5 - 8**)

Result 12: The probability that a seller will incur a **loss** in a trading period is not related to the level of horizontal concentration.[58] Sellers often lost money in a given trading period under the CAP No MFN treatment, regardless of the level of horizontal concentration. We conducted a Chi-square test to examine whether the proportion of sellers that incur a loss across concentration treatments are the same. Because this test generated a Chi-square statistic of ***,6825,*** which is **less** than the critical value consistent with standard levels of significance, we accept the null hypothesis that the proportions are the same. Similar results hold for the proportion of sellers losing money across concentration treatments under both the UNCAP and CAP **MFN** treatment conditions.

Result 13: The size of the average **loss** incurred by Sellers **1** and 2 in a given experimental session is unrelated to the level of horizontal concentration. A Wilcoxon-Mann-Whitney test finds that there is no statistically significant difference in the *size* of the loss incurred by **Sellers** 1 and **2,** conditional on them incurring a loss, in the Low/High versus High/High treatments (p-value = 0.5467), nor is there a statistically

[58] The statistical test does not examine whether the concentration treatment affect differs among sellers.

significant difference in the average loss incurred by Sellers land 2 in the High/High and HighiLow treatments (p-value =.5476). Finally. the same test finds that there is no statistically significant difference in the average loss incurred by Sellers 1 and 2 in the HighiLow and Low/High treatments (p-value = 0.4206).

Result 14: Seller losses are rare in the No *CAP* treatments. In the Low/High and High/High treatments the proportion of losses under the No CAP treatment is significantly lower than under the CAP treatments. Chi-square test statistic values of 14.2 and 15.1 exceed the critical values associated with standard levels of significance. This result is consistent with a previous result indicating that the average buyer's bargaining power is higher in the CAP environment than in the UNCAP environment. The result strongly suggests that the cable operator's bargaining power and, thus, its ability to negotiate favorable affiliate fees with cable networks, is substantially enhanced when the number of cable networks is greater than the cable operator's channel capacity.

Result 15: With the exception of the High/Low concentration treatment, seller losses are not more common under the *CAP* MFN treatment than under the CAP No MFN treatment. A Chi-square test comparing the proportion of sellers that incur **losses** in the CAP No MFN and CAP MFN treatments under each concentration treatment yielded test statistic values of 1.9 (Low/High), 6.0 (High/High), 8.4 (High/Low). The first two test statistics do not exceed the critical values associated with standard levels of significance. The thud test statistic exceeds the critical value at .10 level of significance. Thus, the introduction of an MFN provision by large buyers in the High/Low concentration creates a higher likelihood that sellers will incur a loss in a given trading period?'

The above tests do not differentiate among sellers. However, this lack of differentiation may hide effects that can only be observed when such differentiation is present. Tables 14 and 15 report, for the CAP No MFN and the CAP MFN treatments, the proportion of trading periods in which a particular seller incurred a loss.

[59] Any buyer whose market share was greater than 26.8 % was granted MFN status in the experiments. The High/Low treatment was the only treatment in which two firms were granted MFN status.

	Seller #1	Seller #2	Seller #3	Seller #4
Low Concentration/High Numbers	75.0% -81 4	75.0% -88 7	5 0% -191.0	0%
High Concentration/High Numbers	62.5% -96.6	68.8% -82.6	12.5% -529.5	0%
High Concentration/Low Numbers	60.0% -109.3	45.0% -55.8	15.0% -313.3	10.0% -198.5

Table 14: Percentage of Trading Periods in Which a Seller Incurs a Loss and Average Loss (*CAP* No MFN Treatments)

	Seller #1	Seller #2	Seller #3	Seller #4
Low Concentration/High Numbers	100.0% -155.0	100.0% -136.4	0%	12.5% -1763.0
High Concentration/High Numbers	100.0% -165.8	100.0% -141,4	50.0% -182.5	0.0%
High Concentration/Low Numbers	100.0% -106.3	100.0% -115.1	37.5% -393.7	12.5% -134.0

Table 15: Percentage of Trading Periods in Which a Seller Incurs a Loss and Average Loss (*CAP* MFN Treatments)

Result 16: Small, less popular cable networks are the most likely cable networks to lose money. Sellers 1 and 2, the smallest programming networks, are the most likely to lose money.

Result 17: With one exception, all sellers are more likely to lose money in the CAP MFN environment than in the *CAP* No-MFN environment. In the CAP No MFN treatments, Sellers 1 and 2 frequently lose money in more than half the trading periods, while in the CAP MFN conditions Sellers 1 and 2 lose money in every trading period. With one exception, the more popular programming networks (i.e., Sellers 3 and 4) also

experienced a dramatic increase in the number oftrading periods in which they incurred a financial loss.

Using a trading period as the primary unit of analysis, the above presented the frequency with which a given **seller** incurred a loss and the level of that loss across the different concentration treatments. Using the experimental session (i.e., trading periods 5 – **8)** as the unit of analysis, Table 16 below presents the average loss/profit incurred/earned by each trader across the different concentration treatments!'

	Seller #1	Seller #2	Seller #3	Seller #4	Buyer #1	Buyer #2	Buyer #3	Buyer #4	Buyer #5
Low/ High	-51	-60	477	3001	I256	555	776	1210	847
High/ High	-39	-34	649	2612	551	368	2135	215	774
HigW LOW	-38	1	544	3162	1292	2101			611

Table 16: Average Profit or Loss for All Sellers and Buyers (*CAP* No MFN Treatments)

4.5 Regression Analysis – *CAP* MFN Treatment Data

A series of linear regression models were estimated to explore the determinants of the variations in the affiliate fees, expressed on a price per subscriber basis, and seller net surplus observed **in** the experiments under the CAP MFN treatment!' With one exception, all of the explanatory variables were indicator or "dummy" variables. For example, a dummy variable was created for each buyer. The dummy variable **7%** takes on the value of one when a buyer that **serves 7%** of the MFPD market **trades** with a **seller,** zero otherwise. Likewise, the dummy variable 44% **takes** on the value of one when **a** buyer that serves 44% of the MFPD market trades with a seller, **zero** otherwise. **A**

[60] Note that while the profit or loss of each seller and for buyer #5 can be directly compared across concentration treatments, the profits earned by buyers 1-4 are not directly comparable, since these buyers differ in size as concentration varies.

[61] This analysis was motivated, in part, by the study's ability to provide only qualitative statements regarding hypotheses involving the experimental data generated under the *CAP* MFN treatment.

dummy variable was also created for each seller. For example, the dummy variable Seller #1 takes on the value of one when **Seller** til trades with a buyer. **zero** otherwise. The "period" variable identifies the trading period (e.g., 5-8) at which the trade takes place.

Table 17 below presents the results of two regressions that explore the determinants of the variations in the affiliate fees. expressed on a price per subscriber basis, observed in the experiments. The regression **uses** an estimator that corrected the bias in the standard errors of the estimated coefficients resulting 6-om heteroscedasticity. **A** Shapiro-Wilkes test rejects the null hypothesis that the regression error term is normally distributed. This outcome weakens the reliability of the statistical tests.[62]

[62] The rejection of the normality assumption weakens the reliability of all the t-tests. The extent to which the weakness is worrisome depends upon the calculated t-value. For example, the results of t-tests based upon calculated t-values that are close to +/- 1.96 are subject to more reliability concerns than t-tests results that are based upon higher +/- t-values.

Observations 236 F(14, 221) 22.18 Prob > F 0.0000 Price/ Subscriber	R² .4572 Root MSE .0035 Coefficient (t-value)	(95% Confidence Interval)		Observations 236 F(6, 229) 29.78 Prob > F 0.0000 Coefficient (t-value)	R² .2025 Root MSE 0.0546 (95% Confidence. Interval)	
High/Low				-.0020 (-2.28)	-.0037	-.0002
High/High				-.0013 (-1.56)	-.0031	.0003
7%	,0113 (9.23)	,0089	.0137	-	-	
11%	.0059 **(5.18)**	,0036	.0082	-	-	
13%	,0057 (3.87)	.0028	,0087			
15%	,0112 (10.09)	,0090	.0134			
17% (DBS)	,0069 (6.82)	.0049	.0089			
17% (Cable)	.0069 (7.82)	.0051	,0086			
24%	,0058 (3.96)	,0029	,0087			
27%	.0012 (2.02)	.0000	**,0024**			
39%	.0037 (6.07)	**,0025**	,0049			
44%	.0028 ***(5.25)***	,0017	.0039			
Seller #1	-.0069 **(-10.02)**	-.0083	-.0056	-.0067 (-9.93)	-.0080	-.0053
Seller #2	-.0078 (-8.98)	-.0095	-.0061	-.0067 -9.93	-.0080	-.0053
Seller #3	-.0016 (-2.25)	-.0030	-.0002	-.0015 -1.75	-.0033	.0001
Period	-.0002 (-.91)	-.0007	.0002	-.0002 (-.76)	-.0008	.0003
constant	.0035 (1.87)	-.0001	.0073	,0102 (4.32)	.0055	.0149

Table **17:** Price Per Subscriber Regression
***(CAP*MFN** Treatment)

The constant term captures the effect of the dummy variables that are not explicitly included in the model. Specifically, the constant term captures the effects that a buyer that serves 51% of the MVPD market and the most popular seller (i.e., Seller **#4)** has on the affiliate fees negotiated by such participants. Therefore, the estimated